

Priority 14: Provide water to enhance seasonal wetlands, permanent wetlands, and riparian habitat for aquatic and terrestrial species on State and Federal wildlife refuges and on other public and private lands
REV 2: Magnitude of ecosystem improvements
<p>What is the expected magnitude of the ecosystem improvement that will address this priority? Magnitude should be expressed as: a) the change from current conditions without the project to current conditions with the project, and b) the change from 2030 conditions without the project to 2030 conditions with the project. How did you estimate this value?</p> <p>As illustrated in the Eligibility and General Project Information Tab, A.3 Project Description, the proposed project would create a new reservoir along the Bear River with a storage capacity of 110,000 acre-feet and a maximum inundation area of approximately 1,300 acres. The proposed Centennial Reservoir would operate as a "fill-and-spill" project, with a priority to maximize reservoir storage during the winter and early spring runoff period. During the water delivery period (late spring through early fall), Centennial Reservoir would be used in coordination with NID's existing reservoir network to provide water to customers in NID's lower Bear River watershed service area. During the majority of years and as hydrologic conditions allow, Centennial Reservoir would be operated at or near its full gross storage (110,000 acre-feet) throughout the year, with any seasonal drawdowns due to minimum instream flow requirements and evaporative losses. In the fall and early winter, Centennial Reservoir would store any watershed runoff (in excess of minimum instream flow requirements) in order to return the reservoir to full pool.</p> <p>Approximately 1,300 acres of open water habitat created by the proposed project during maximum pool conditions would replace approximately 188.2 acres (Bear River [183.005 ac]; Ponds [5.218 ac]) of open waters identified in the wetlands delineation of the projected area of inundation. In addition to the Bear River and pond, "other waters" habitat, the project would inundate or otherwise affect other habitats considered waters of the U.S. including perennial marshes, riparian wetlands, seasonal marshes, seasonal wetlands, seasonal wetland swales, and seeps, as well as drainage and other features including the ephemeral drainages, intermittent drainages, perennial creeks. The total area of these habitats is 22 acres.</p> <p>Reservoir development is expected to create conditions adjacent to and within the inundation area that allow for establishment of riparian and wetland habitats, including perennial and seasonal wetlands (i.e., perennial marsh, seasonal marsh, and seasonal wetlands) in existing upland areas that do not currently support the hydrological conditions necessary to maintain such habitats. Adjacent fringe upland areas would be subjected to higher ground water when the reservoir is at or near maximum pool. These hydrologic conditions are expected to promote establishment of aquatic plant species that tap into this source of water and create fringe wetlands in existing upland areas. In addition, preliminary topographic analyses of the proposed reservoir inundation pool indicate that several relatively shallow areas would be formed in coves and other areas that would potentially provide the physical conditions conducive for the establishment of riparian and wetland habitats. The cove areas are primarily located in existing drainage basins that are adjacent to upland shrub and/or forested habitats. Shallow inundation of these area, particularly along the interface of the maximum inundation pool, is expected to convert to riparian and/or wetlands where physical conditions (e.g., water depth, frequency of inundation, suitable soil saturation) allow. It is estimated that 107.87 acres of relatively shallow cove habitat would be created as a result of reservoir inundation. In addition, 115.12 acres of the reservoir would be in 0-10ft of water when the reservoir is at maximum pool. These shallow water areas are also expected to provide the physical conditions where wetland and riparian vegetation may establish. Therefore, the proposed reservoir at or near maximum pool would provide a total of approximately 223 acres that may ultimately support riparian and/or wetland habitats (Figure 1, Approximate Location of Potential Ecological Benefits). Subtracting the 22 acres of wetlands and "other waters" that the Project would inundate, the net total benefit is 201 acres.</p> <p>While it is premature to estimate the extent of riparian and wetland habitat that may establish in coves and other shallow water areas within the proposed reservoir, when at the normal maximum pool approximately 223 acres provide substantial opportunities for newly created riparian and/or wetland areas.</p>
Additional locations in the application, supporting documentation or attachments (document name, page number, table number, other) where the magnitude of the ecosystem improvement is described and quantified.
REV 3: Spatial and temporal scale of ecosystem improvements.

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<p>What is the geographical extent (e.g. river miles, acres) of the ecosystem improvement that will address this priority?</p>
<p>As shown in Figure 1: Approximate Location of Potential Ecological Benefits, the proposed project would create 107.86 acres of shallow cove areas which, as noted above would support the establishment of riparian and wetland habitats, including perennial and seasonal wetlands (i.e., perennial marsh, seasonal marsh, and seasonal wetlands) in existing upland areas that do not currently support the hydrological conditions necessary to maintain such habitats. At maximum pool, the proposed reservoir would provide 1,300 acres of open water habitat, supplanting 175 acres of open water that is extant in the Bear River [169.534 ac]; Ponds [5.218 ac])</p>
<p>Additional locations in the application, supporting documentation or attachments (document name, page number, figure name or number, other) where the geographical extent of the ecosystem improvement is documented or mapped.</p>
<p>When during the year will water be provided for seasonal wetlands, permanent wetlands, and riparian habitat? How are seasonal wetlands, permanent wetlands, and riparian habitat likely to vary with hydrologic conditions (i.e. among water year types) a) under current conditions with and without the project, and b) in 2030 with and without the project?</p>
<p>As stated above, the proposed Centennial Reservoir would operate as a “fill-and-spill” project, with the goal to maximize reservoir storage during the winter and early spring runoff period. During the water delivery period (late spring through early fall), Centennial Reservoir would be used in coordination with NID’s existing reservoir network to provide water to customers in NID’s lower Bear River watershed service area. This use would allow additional water to be captured from diversions out of NID’s Mountain Division system in the Yuba River watershed, as well as natural runoff in the Bear River watershed (both the runoff in excess of what Rollins Reservoir can store on a seasonal basis as well as the runoff in the sub-basin below the Rollins Dam catchment).</p> <p>During the majority of years and as hydrologic conditions allow, Centennial Reservoir would be operated at or near its full gross storage (110,000 acre-feet) throughout the year, with any seasonal drawdowns due to minimum instream flow requirements and evaporative losses. In the fall and early winter, Centennial Reservoir would store any watershed runoff (in excess of minimum instream flow requirements) in order to return the reservoir to full pool.</p> <p>During a dry year, Centennial Reservoir storage could be used to augment the reliability of NID’s water supply in the Bear River watershed. Seasonal drawdown would vary based on the severity of the annual (or multi-year) drought condition.</p> <p>Seasonal Releases - Releases from Centennial Reservoir would vary by season and hydrologic year type and would consist of a combination of minimum environmental flows (yet to be established), discretionary releases for water supply, and spill. Seasonally, flows in the Bear River below Centennial Reservoir are expected to peak in the late summer as water deliveries are passed through Centennial Reservoir (via Rollins Reservoir) for delivery to Lake Combie and NID’s Phase I Canal. In most years, winter and spring spill can be anticipated to reach Combie Reservoir during heavy rain events in the Bear River watershed. The lowest seasonal releases from Centennial Reservoir would occur during the late fall through early winter in most years, as the reservoir refills from any mid-year drawdown and downstream water delivery demands wane.</p> <p>Preliminary reservoir operations are described above. To the extent that reservoir creation and operation would improve hydrological conditions in upland areas currently unable to support seasonal wetlands, permanent wetlands, and riparian wetlands conditions, the creation and operation of the reservoir would allow the creation and maintenance of wetland habitat in areas where topographic and soils conditions are suitable. As noted, however, the reservoir would be operated to maximize reservoir storage during the winter and early spring runoff period to provide water to customers in NID’s lower Bear River watershed service area. Operations would not be altered for the purpose of wetland habitat development and maintenance.</p> <p>Although reservoir conditions may vary slightly year to year as a result of seasonal hydrological conditions, the hydrologic conditions in the area that would support wetlands and riparian habitats are expected to remain stable. Thus, with the proposed project there is the potential to create up to 223 acres of enhanced wetlands and riparian habitat. These enhanced wetlands and riparian habitat would exist through the lifetime of the project (i.e. beyond 2030). Without the project, the river channel would remain the same and there would only be 22 acres of wetland or “other waters” habitat available.</p>
<p>Additional locations in the application, supporting documentation or attachments (document name, page number, table number, other) where the timing of water releases for seasonal wetlands, permanent wetlands, or riparian habitat improvements are described and quantified.</p>
<p>REV 4: Inclusion of an adaptive management and monitoring program that includes measurable objectives, performance</p>

measures, thresholds, and triggers to achieve ecosystem benefits.
Provide additional information on how this ecosystem improvement will be incorporated into the adaptive management and monitoring program. If available, provide examples of objectives, performance measures, thresholds, or triggers that could be used to manage benefits associated with this priority.
The Federal and State permitting processes preceding CEQA and NEPA certification and final project approval will be extensive. NID shall coordinate with USACE, USFWS, and California DFW to prepare adaptive management and monitoring programs to address wetlands and waters of the U.S., federally and state-listed plant and animal species potentially affected by the proposed project as well as native fisheries management. Given that the proposed project is in the early stages of planning and environmental review, such programs have yet to be developed.
REV 5: Immediacy of ecosystem improvement actions and realization of benefits
Immediacy of ecosystem improvement: Number of months from grant encumbrance until the proposed ecosystem improvement is completed (i.e. the expected timeframe until the improvement is implemented or construction is completed).
Approximately 36 months. It is estimated that the project would take two to three years for construction. Upon completion of construction, the period of time to fill the reservoir is estimated to range up to three years. The benefits for the establishment of early successional wetland habitat are anticipated to be immediate upon the attaining reservoir maximum pool.
Additional locations in the application, supporting documentation or attachments (document name, page number, table number, other) where the immediacy timeframe is described and quantified.
Realization of ecosystem improvement: Number of months from the time the ecosystem improvement is completed (i.e. project is implemented or construction is complete), until the benefit associated with this priority can be observed (i.e. when measurable improvements can be observed and quantified)
Approximately 0 months. The ecosystem improvement opportunity for the establishment of early successional wetland and riparian habitat is anticipated to be established immediately in the first year in which the reservoir is filled. As stated above, it is anticipated that upon completion of construction, the period of time to fill the reservoir is estimated to range up to three years. The benefits for the establishment of early successional wetland habitat are anticipated to be immediate upon the attaining reservoir maximum pool. The development of mid-succession and late-succession species in wetland and/or riparian areas created by the proposed project would be an ongoing process subsequent to the completion of the proposed project.
Additional locations in the application, supporting documentation or attachments (document name, page number, table number, other) where the realization timeframe is described and quantified.
REV 6: Duration of ecosystem improvements
How long (number of years) after realization (as calculated under REV 5 above) is the ecosystem improvement expected to address this priority? Maximum is 100 years. Explain how this value was determined and whether the magnitude of the ecosystem improvement is anticipated to change over time.
100 years. The reservoir and related facilities are expected to be permanent and with appropriate maintenance would last for 100 years. Reservoir operations under the proposed project are envisioned to continue for the foreseeable future. With operation of the reservoir, the benefits of the proposed project for the purpose of wetland habitat development would be ongoing.
Additional locations in the application, supporting documentation or attachments (document name, page number, table number, other) where the duration of the ecosystem improvement is described and quantified.
REV 7: Consistency with species recovery plans and strategies, initiatives, and conservation plans
Does the ecosystem improvement meet any goals or objectives established in existing species recovery plans, initiatives, or conservation plans including but not limited to the NOAA Fisheries Recovery Plan for Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, and Central Valley steelhead; State Wildlife Action Plan; Central Valley Joint Venture Implementation Plan, San Joaquin County Multi-Species Habitat Conservation Plan and Open Space Plan, Draft Solano Multi-Species Habitat Conservation Plan, East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan, Draft Recovery Plan for the Giant Garter Snake, and California Water Action Plan? If so which goals, objectives, or actions will be met? Why?

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<p>The 2014 California Water Action Plan was developed to meet three broad objectives: “more reliable water supplies, the restoration of important species and habitat, and a more resilient, sustainably managed water resources system (water supply, water quality, flood protection, and environment) that can better withstand inevitable and unforeseen pressures in the coming decades.” A critical element in achieving these objectives is the creation of additional surface storage. As stated in the plan, “The bottom line is that we need to expand our state’s storage capacity, whether surface or groundwater, whether big or small. Today, we need more storage to deal with the effects of drought and climate change on water supplies for both human and ecosystem needs.” Opportunities for the development of a major on-stream surface storage project in California are limited as evidenced by the fact that it has been 40 years since the last such project was completed. Centennial reservoir presents an ideal opportunity for developing new significant surface storage. The proposed project would be located on a highly regulated reach of the Bear River located between two existing reservoirs: Combie and Rollins located immediately downstream and upstream, respectively, of the Centennial site.</p>
<p>Additional locations in the application, supporting documentation or attachments (page number, table number, other) where the consistency with goals, objectives, or actions from recovery plans, initiative, or conservation plans are discussed.</p>
<p>REV 8: Location of ecosystem improvements and connectivity to areas already being protected or managed for conservation values</p>
<p>Provide a map that shows the extent of the ecosystem improvement that will address this priority (e.g. river miles that meet the temperature benefits). Provide additional instructions or clarification to reviewers who will be viewing this map (i.e. describe the color and/or label that identifies the spatial extent of the ecosystem improvement). If available, also submit supporting electronic files such as a .kmz file or ArcGIS layer associated with the maps provided.</p>
<p>Figure 1 referenced above shows the location of potential areas of ecological benefits associated with the proposed project.</p>
<p>Explain why this location was selected. How does this location enhance seasonal wetlands, permanent wetlands, and riparian habitat for aquatic and terrestrial species in the context of local environmental conditions?</p>
<p>As described above, the location being evaluated for Centennial Reservoir would effectively work in conjunction with NID’s existing Rollins Reservoir to expand the total storage capability in the Bear River watershed. This use would allow additional water to be captured from natural runoff in the Bear River watershed (both the runoff in excess of what Rollins Reservoir can store on a seasonal basis as well as the runoff in the sub-basin below the Rollins Dam catchment) for the purpose of maximizing reservoir storage during the winter and early spring runoff period to provide water to customers in NID’s lower Bear River watershed service area. Reservoir creation in this location would substantially alter the hydrology of upland areas that have the topography and soils conditions to support wetland habitat, but not the water source. Although, enhanced wetland and riparian habitat is inherent to project implementation it is not the primary factor in siting the proposed project.</p>
<p>Is the ecosystem improvement location adjacent to, within, or near, other areas already being protected or managed for conservation values? Explain the proximity of the ecosystem improvement to other areas already being protected or managed for conservation values and any hydrologic connectivity that may occur between these locations.</p>
<p>The proposed reservoir site being considered is not currently adjacent to, within or near other areas protected or managed for conservation purposes.</p>
<p>Additional locations in the application, supporting documentation or attachments (document name, page number, figure name or number, other) that describe and quantify the spatial extent of the ecosystem improvement, the proximity of the ecosystem improvement to other areas already being protected or managed for conservation value, and the degree to which hydrologic connections (if any) occur between the ecosystem improvement and areas already being protected or managed for conservation value.</p>
<p>REV 9: Efficient use of water to achieve multiple ecosystem benefits</p>
<p>How will water provided to address this priority be managed? Explain design efficiencies and operational strategies intended to maximize the efficiency of water allocated to ecosystem improvements that address this priority.</p>
<p>Refer to REV 3, above.</p>
<p>Additional locations in the application, supporting documentation or attachments (document name, page number, figure name or number, other) that describe the design efficiencies and operational strategies used to maximize water efficiency under this priority.</p>

REV 10: Resilience of ecosystem improvements to the effects of changing environmental conditions, including hydrologic variability and climate change.
Which environmental uncertainties associated with this priority were considered in the project siting, design, and operation? How were these uncertainties incorporated into project siting, design, or operation? Examples of environmental uncertainties include, but are not limited to: sea level rise, temperature changes, changes in precipitation, landslides, erosion, earthquakes, wildfires, drought events, and flooding events.
<p>As noted under REV 7 above, the proposed project would help meet the statewide need for more surface water storage to help address the uncertainties of future drought and climate change and their effects on water supplies for both human and ecosystem needs. Centennial Reservoir presents an ideal opportunity for developing new significant surface storage.</p> <p>Also as stated above under REV 7 and 8, the area being evaluated for the proposed project is considered a suitable location along the Bear River since it would be located on an already regulated reach of the Bear River between two existing reservoirs. The ecosystem improvements related enhanced wetland and riparian habitats would result from coordination with the resource agencies and preparation and implementation of adaptive management and monitoring programs during development of the Proposed Project.</p>
Additional locations in the application, supporting documentation or attachments (document name, page number, figure name or number, other) that describe and quantify the environmental uncertainties considered in the project siting, design, and operation.